Challenging Design Aspects of a 3-Tower Cable-Stayed Bridge

John BRESTIN
Vice President
Buckland & Taylor
Seattle, WA, USA
jnbn@b-t.com

John Brestin, born 1968, received his Bachelors of Science in Civil Engineering from the University of Nebraska and his Masters of Science in Civil Engineering from Purdue University. He worked for Kiewit Construction and HNTB before joining Buckland & Taylor to direct major bridge projects.

Tian-Jian (Steve) ZHU
Executive Engineer
Buckland & Taylor
Vancouver, BC, CANADA
tjz@b-t.com

Tian-Jian (Steve) Zhu, born 1960, received his Bachelors of Engineering from Zhejiang University in China and his Masters of Engineering and Doctor of Philosophy from McMaster University in Canada. He is an executive engineer with Buckland & Taylor.

John FINKE
Department Manager
Jacobs
St. Louis, MO, USA
John.Finke@jacobs.com

John Finke, born 1964, received his Bachelors of Science in Civil Engineering from the University of Missouri at Rolla and his Masters of Science in Structural Engineering from Washington University in St. Louis. He is the manager of the Structures Department in St. Louis, MO.

Summary

Keywords: Cable-Stayed Bridge, Three Towers, Dynamic Analysis, Foundations, Durability, Accelerated Schedule.

1. Introduction

A three tower cable-stayed bridge brings with it a unique set of challenges for the design team. This presentation focuses on those challenges by looking in depth at the Downtown Louisville crossing over the Ohio River. The final design of this structure presented unique geotechnical conditions, site specific seismic design spectrum developed, aggressive scour conditions, erection method, wind engineering analysis all completed on an extremely aggressive design and construction schedule will be discussed. We will also explain the inherent flexibility of a three tower cable-stayed bridge with no anchor cables to stiffen the center tower and foundations consisting of a single row of shafts at each tower and anchor pier. Probabilistic service life design to attain 100 years of life is employed on this bridge to assure a proper level of durability, service life design is in its infancy in North America and therefore afforded an additional level of complexity to the design. A collaborative effort well underway between the Kentucky Transportation Cabinet, Walsh Construction, Jacobs and Buckland & Taylor has led to a landmark project well on its way towards an expected opening in 2016.

Fig. 1: Night Bridge Rendering

https://doi.org/10.2749/222137814814068571
Distributed by structurae